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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| MARSHALL, GERSTEIN & BORUN LLP 6300 SEARS TOWER 233 S. WACKER DRIVE CHICAGO, IL 60606 | | | EXAMINER WYROZEBSKI LEE, KATARZYNA I | |
| | | | ART UNIT 1714 | PAPER NUMBER |

DATE MAILED: 01/07/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/870,239

Applicant(s)

LAN ET AL.

Examiner

Katarzyna Wyrozewski Lee

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 October 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 and 27-30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15 and 17-30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 1201. 6) ☐ Other: _____

In view of applicant's amendment and request for continuing prosecution following non-final office action has been necessitated. The rejection over the prior art of BARBEE is not overcome and is restated here by reference. Claim 16 is cancelled and claims 1-15, 17-30 are pending.

The amendment to claims as presented on 10/27/2003 included incorporation of following limitations:

a layered clay material that has essentially all of its exchangeable cations exchanged with one or more organic cations, achieved by analyzing the layered material for cation exchange capacity, and then contacting the layered material with said organic cations, or salts thereof, in an amount no more than 5% more than the amount required for complete ion-exchange, as determined by said analysis, such that the cation exchanged layered material (and)contains extractable salts of organic cations in an amount no more than 5 weight % of the layered clay material after ion-exchange.

The above limitation is shadowing the preamble of the claim, which case the claim is viewed as product by process claim. In such event, patentable weight is given to the product and not to the process by which it has been made.

In the even the applicant attempts to traverse the above statement, the examiner would like to point out that the limitation of "...analyzing the layered material for cation exchange capacity..." is a step that would be inherent for following reasons. If one of ordinary skill in the art attempts to add 1.0-1.5 equivalents of the ammonium cation to the layered clay, one has to know the cation exchange capacity of the clay that is being utilized, therefore the clay had to be analyzed by a method. These methods in such broad claim include anything from looking up the cation exchange capacity in chemical handbook or chemically testing it.

Claim Rejections - 35 USC § 102

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
2. Claims 1-15, 17, 20-26, 29-30 are rejected under 35 U.S.C. 102(e) as being anticipated by BARBEE (US 6,384,121)

The applied reference has a common inventor (John Walker Gilmer of Eastman Kodak) with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

The prior art of Barbie discloses composition for clay nanocomposite comprising clay intercalated with ammonium compound and delaminated.

Intercalation process described by the prior art of Barbie comprises steps of dispersing clay in hot water, adding organic cation and agitate the mixture for the period of time sufficient to intercalate most of the organic cation between the clay platelets (col. 12, lines 15-25. The clay is then subjected to filtration and centrifugation. In col. 11, lines 10-13, the prior art of Barbie further discloses partial or complete cation exchange. In addition, in preferred embodiment, the amount of the organic cation utilized to make organoclay is 1.0-1.5 equivalents, wherein excess

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of cations facilitates more complete cation exchange. Since the molar excess of ammonium compound is 0.5 molar equivalents, then in the complete exchange the amount of the extractable salts will not be greater than 0.5 molar. The organic cation of BARBEE does not need to be removed as it is indicated in the prior art (col. 12):

organic cation salt can be used. It is preferred that about 0.5 to 2 equivalents of organic cation salt be used, more preferable about 1.0 to 1.5 equivalents. It is desirable, but not required to remove most of the metal cation salt(s) and most of the excess organic cation salt(s) by washing and other techniques known in the art.

According to the claims of the prior art of Barbee, the clay component is smectite type clay such as sodium montmorillonite and sodium bentonite (cl. 8, 9). The clay has cation exchange capacity of 0.9-1.5 meq/g (cl. 10). Clay is utilized in an amount of greater than zero to about 25 % (cl. 6), preferably up to 15 % (cl. 7). At least 50% of the clay platelets are delaminated, have thickness of less than about 2 nm and diameter of 10-3000nm (cl. 11).

The matrix polymer utilized in the prior art of Barbee is selected from polyamides, polyesters and the like (cl. 26-29). Specifically, polyamides include partially aromatic polyamide, aliphatic polyamide, wholly aromatic polyamide and mixture thereof. Examples of polyamides include poly(*m*-xylylene adipamide), copolymer thereof, isophthalic acid modified poly(*m*-xylylene adipamide), nylon-6, nylon-6,6. Additional specific polymers include EVOH and PET.

In process intercalated clay is then further intercalated with an oligomer to form concentrate and then mixed with matrix polymer (cl. 37). The oligomer utilized as intercalant has the same monomer units as matrix polymer (cl. 41). The melt mixing is conducted *via* batch mixing or melt compounding using an extruder (cl. 38).

In the light of the above disclosure, the prior art of Barbee anticipates requirements of the claims rejected above.

Claim Rejections - 35 USC § 103

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

4. Claims 18, 19, 27 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over BERBEE (US 6,384,121) in view of BANIN (US 3,725,528).

The discussion of the disclosure of the prior art of BARBEE from paragraph 2 of this office action is incorporated here by reference.

The difference between the present invention and the disclosure of the prior art of BARBE is recitation of titration as step determining the cation exchange capacity of the clay utilized in forming the intercalate.

With respect to the above difference, the prior art of BANIN discloses process for quantitative ion exchange for clay.

In the process of BANIN the fresh clay was subjected to pH metric titration to determine the amount of exchangeable cations.

Utilizing titration to determine the clay cation exchange capacity would allow one of ordinary skill in the art to determine how much of the organic cation should be used in order to arrive at 1.0-1.5 equivalents of ammonium to clay as taught by the prior art of BARBEE.

In the light of the above disclosure it would have been obvious to one having ordinary skill in the art at the time of the instant invention to utilize titration as one of the methods of determining clay exchange capacity and arrive at the 1.0-1.5 equivalent of ammonium compound as it has been done in the prior art of BARBE and with such low amount of extractable amounts the step of washing is not required.

In the amendment filed on 10/27/2003 the applicants argued following:

a) The prior art of BARBEE teaches that most of the excess of organic cation salt can be removed by washing.

With respect to the above argument, term "can" does not mean that it is. In fact the prior art of BARBEE states in col. 12 that:

organic cation salt can be used. It is preferred that about 0.5 to 2 equivalents of organic cation salt be used, more preferable about 1.0 to 1.5 equivalents. It is desirable, but not required to remove most of the metal cation salt(s) and most of the excess organic cation salt(s) by washing and other techniques known in the art.

According to the prior art of BARBEE, it is not required to remove organic cations, which further indicates that they can be left in the composition and do not have detrimental effects of the product is left.

b) The applicant's invention is directed to initially providing the proper stoichiometric amount of organic cations to provide for complete or nearly reaction.

With respect to the above argument, the prior art of BARBEE provides for that stoichiometric amount by citing that their most preferable molar equivalent of ammonium is 1.0-1.5%. This simply indicated that they want to obtain intercalation and eventually exfoliation.

c) Certain characteristics that may be present in a prior art reference are not sufficient to establish inherency of those characteristics.

In case of the *In re Rijckaert* (cited by the applicants), which talks about obviousness of the apparatus that is utilized to record and to reproduce electric signal on magnetic carrier that may be the case. In other words, if you flip the switch it may play music instead of record it.

On the other hand, in chemical world properties or characteristics of the species or compositions are inherent to the compounds and therefore to the compositions containing these compounds.

d) The applicants are first to discover the problems resulting from excess of organic cations.

With respect to above statement, the examiner believes that the problem has been known since many prior art disclosures try to remove the excess cations. With respect to the EIBL process, the examiner request that the applicants provide the copy of the court decision, as the examiner was not able to find it. The examiner reserves right to further address this issue once the copy of the court decision is provided.

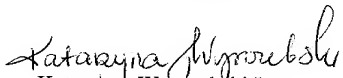
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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Katarzyna Wyrozebski Lee whose telephone number is (571) 272-1127. The examiner can normally be reached on Mon-Thurs 6:30 AM-4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vasu Jagannathan can be reached on (571) 272-1119. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.


Katarzyna Wyrozebski Lee
Primary Examiner
Art Unit 1714

December 24, 2003